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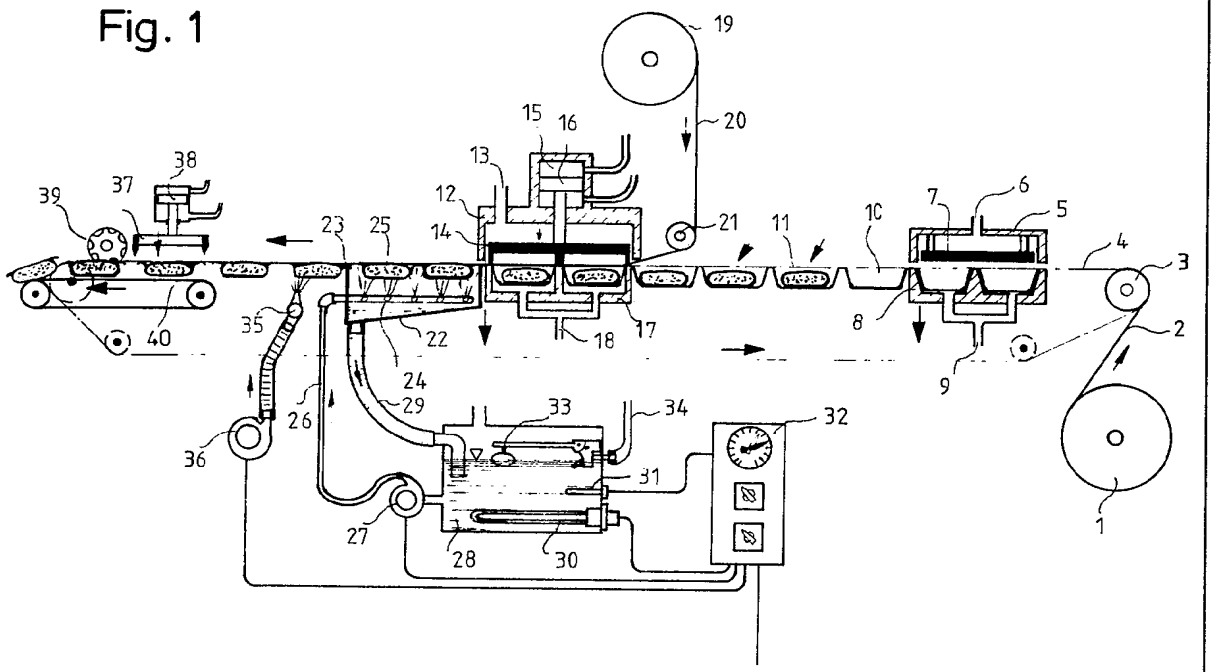
(54) Method of and apparatus for producing a package

(57) A method of and an apparatus for producing a package include spraying a hot liquid against the package, as a result of which a pre-stretched film shrinks uniformly against the contents of the package. A flow of air removes the residual water remaining on the package. The apparatus includes a spray tube *24*, a water-collection tray *22* and a hot-water container *28*, between which the liquid is circulated. The spray tube and the water tray can be driven from below against the package in the sequence of operation of the deep-drawing machine which comprises a lower web-pocket forming station 6-9 and package evacuation and sealing station 12-18.

Fig. 1



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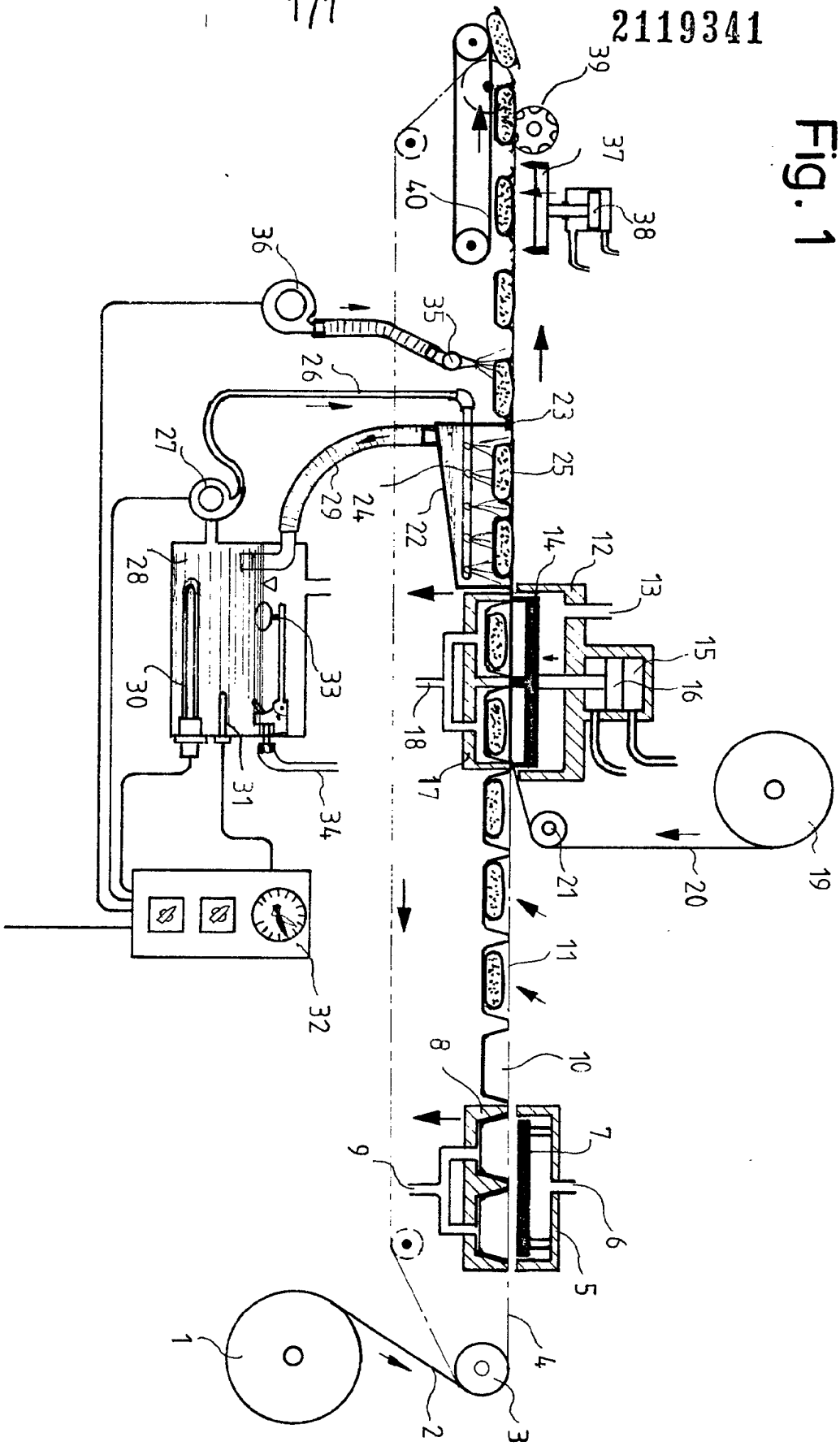

Fig. 1

SPECIFICATION

Method of and apparatus for producing a package

This invention relates to a method of and an apparatus for producing a package from two strips of film on a roller-type deep-drawing machine, in which pre-stretched film is shrunk during application of heat.

A method of this general kind is known, for instance from German laid-open application DE-OS 23 64 565. In such a method, during the course of operation in a roller-type deep-drawing machine, a package is sealed either temporarily or permanently within an evacuated chamber. A lower film which includes a package depression, is heated to a temperature which effects a shrinkage process in the vicinity of the depression either before or during the refilling of the vacuum chamber or both. The heating is carried out by means of radiation from a heating plate, an inflow of heated air, or through pressing the package depression into a heating chamber of corresponding shape. This method exhibits a variety of disadvantages. It is not possible to heat the film quickly, uniformly and to the correct temperature by means of either radiated heat or an inflow of hot air. Where a pressing operation is employed, so that the film depression is pressed against an appropriately shaped heating chamber by means of a pressure difference between the interior and the exterior in order to heat it, the film does attain the temperature required for shrinkage; however, there is frequently a negative effect on the shrinkage process and to some extent on the transparency of the film caused by uneven contact against the package depression and the attendant striation of the film. Furthermore when the film is placed in contact with the product in the package, such as meat or sausage, which is usually cold, the temperature required for shrinkage is momentarily lacking.

Thus far, this method has furthermore been used primarily in machines other than roller-type deep-drawing machines, that is, in machines devised especially for it and intended primarily for processing shrinking-type pouch packages. When packages produced on roller-type deep-drawing machines are then shrunk in these so-called shrinkage tunnel machines, the additional process results in substantially increased costs.

In cognizance of this prior art, it is an object of the present invention to provide a method of the general type discussed above, and an apparatus for performing this method, in such a way that the above-discussed disadvantages are reduced or overcome and that it is possible to produce packages that have been satisfactorily shrunk, in rapid sequence and with uniform shrinkage, in a single operaton on a roller-type deep-drawing machine.

According to one aspect of the present invention there is provided a method of producing a package from two film strips on a roller-type deep-drawing machine, wherein pre-stretched film is treated to form a depression for holding a product, and treated by the action of heat to seal the product therewithin, and wherein a liquid at high temperature is sprayed against the product-filled depression subsequent to the treatment and sealing steps, thereby to shrink the film around the product.

In carrying out the present method, as a result of spraying a high temperature liquid against cup-shaped packages, which have been filled with a product, subsequent to steps of evacuation and sealing, the film shrinks to a satisfactory degree, resting firmly against the product in a substantially wrinkle-free manner. The liquid used is preferably water, at a temperture of from 80 to 100°C, and it is preferably sprayed against the packages from below.

The transfer of heat from the hot water to the film is very favourable, because the water is preferably sprayed turbulently onto the film. The film is heated not only very quickly but also uniformly and to an accurate temperature. Particularly because of the short processing time, and the heat-insulating effect of the film material, the product is unaffected by the relatively high temperature of the water.

According to a preferred variation of the method, the flow of liquid is followed by a flow of air directed at high pressure against the packages. As a result, the water adhering to the package, which is inherently slight in amount, is removed from the package by the stream of air arriving at the underside of the package.

According to another aspect of the present invention there is provided apparatus for performing the method described above, comprising spray tube means interconnected with a hot-water source and nozzle means, said nozzle means being directed toward said package filled with the product; said spray tube being located inside a water-collection tray and being movable, upwardly against the transverse edges of the package. The water-collection tray can be moved upward, preferably in synchronism with the stroke movement of the lower part of an evacuation and sealing station, against the frame-like, transverse edges of the package, which is filled with a pressed product. Thus the shrinkage of the package can be performed in the same sequence as the actual production of the package.

The hot-water source is preferably a water container equipped with a thermostatically controlled heating means, while the spray tube is connected to the water container via a hose and a pump.

Following the water-collection tray with the spray tube in the sequence of operation, an air nozzle may be provided connected to a high-pressure blower, by means of which a stream of air can be directed briefly against the underside of the shrunk package. As a result, any water which may remain on the package can be reliably removed in the same operation.

The water container is conveniently connected to the fresh-water supply system via a float valve and the fresh-water inflow line, while the water temperature can be adjusted and regulated via a temperature sensor and an electrical switch box with a regulator element. The water-collection tray and the hot-water container are conveniently connected to one another via a return-flow hose, so that the water that is sprayed against the package can be returned to the

hot-water container, creating a circulation of hot water such that only relatively small quantities of water are required for refilling.

Further advantages, details and characteristics of the invention will become apparent from the following description of a preferred exemplary embodiment, taken in conjunction with the accompanying drawing which is a longitudinal section taken through a roller-type deep-drawing machine which is shown in schematic form and provided with the apparatus in accordance with the invention.

In the description which follows, all details are explained in the order of their occurrence in the sequence of operation.

From a lower film-unwinding roller 1, a lower film strip 2 travels over a deflection roller 3 to a film-advancement chain 4, by which it is engaged and carried by indexing through all the stations of the machine.

This occurs first to the apparatus which is embodied, in principle, by an upper part 5 of the deep-drawing station and a deep-drawing form 8 which can be lowered in the direction of the arrow. In this apparatus, the film is deepdrawn, after being heated by a heating plate 7 and drawn by a vacuum applied via the connection 6, into a cup shape corresponding to the form of the product 11 by means of the application of a vacuum at a vacuum connection 9.

The product being packaged is then placed in the package depressions 10, either by hand or mechanically and automatically. Beginning at an upper film-unwinding roller 19 and after deflection by a deflection roller 21, the upper film strip 20 then travels together with the lower film strip 4 into an evacuation and sealing station, which comprises two halves 12 and 17. At this station, the package containing the product is evacuated through vacuum connections 13 and 18, and the upper film strip 20 is sealed to the package with a sealing weld in a known manner by means of a heated sealing plate 14, a compressed-air cylinder 15 and a piston with a piston rod 16.

As the sequence of opertion continues, there is a water-collection tray 22 with a spray tube 24 attached to its bottom, which is movable upward and downward, being coupled with the stroke movement of the lower part 17 of the evacuation and sealing station.

In the upper position shown in the drawing, hot water is briefly sprayed against the package 25 containing the product 11, the water being supplied to the spray tube 24 from a water container 28 via a hose 26 by means of a pump 27.

The water-collection tray 22 has elastic seals 23 on the upwardly protruding walls, so that the water cannot escape at the sides; in other words, it is caught and flows back to the water container 28 via a return-flow hose 29.

The water container 28 is equipped with an electric heating rod 30, a float valve 33 and a fresh-water inflow line 34. With the latter two elements, the water level in the water container 28 is kept approximately constant. The required water temperature is established at an electrical switch box having a regulator element 32, is measured with the temperature sensor 31 and is held at a set-point value.

After the shrinkage of the packages, an air nozzle 35 supplied by a high-pressure blower 36 is used as the operation continues, so that the water remaining on the packages 25 containing the product 11 is removed with a stream of air.

The packages then move into the cutting station, which comprises a transverse cutting apparatus 37 with a compressed-air cylinder 38 and a revolving-blade, longitudinal cutting apparatus 39, and are thereby severed both crosswise and lengthwise from the film strip. The packages then drop onto a conveyor belt 40 at the outlet side.

CLAIMS

1. A method of producing a package from two film strips on a roller-type deep-drawing machine, wherein pre-stretched film is treated to form a depression for holding a product, and treated by the action of heat to seal the product therewithin, and wherein a liquid at high temperature is sprayed against the product-filled depression subsequent to the treatment and sealing steps, thereby to shrink the film around the product.

2. A method as claimed in claim 1, wherein the liquid comprises water at a temperature of from 80° to 100°C.

3. A method as claimed in claim 1 or 2, wherein the liquid comprises water at a temperature of from 92° to 96°C.

4. A method as claimed in any one of claims 1 to 3, wherein the spraying is effected by directing the liquid against the package from below.

5. A method as claimed in any one of claims 1 to 4, wherein spraying the heated liquid is followed in sequence by directing an air flow at high pressure against the package.

6. A method of producing a package from two film strips on a roller-type deep-drawing machine substantially as hereinbefore described with reference to the accompanying drawing.

7. Apparatus for performing the method claimed in claim 1, comprising spray tube means interconnected with a hot-water source and nozzle means, said nozzle means being directed toward said package filled with the product; said spray tube being located inside a water-collection tray and being movable, upwardly against the transverse edges of the package.

8. Apparatus as claimed in claim 7, wherein said hot-water source comprises a water container equipped with thermostatically controlled heating means, said spray tube being connected to said water container by a hose and a pump.

9. Apparatus as claimed in claim 7 or 8, wherein an air nozzle connected to a high-pressure blower is provided following said water-collection tray in the sequence of operation so that an air stream can be directed briefly against the underside of each shrunk package.

10. Apparatus as claimed in any one of claims 7 to 9, wherein said water container is connected to a fresh-water supply system via a float valve and a fresh-water inflow line, and the water temperature

can be adjusted and regulated via a temperature sensor and an electrical switch box having a regulator element.

11. Apparatus as claimed in any one of claims 7 to 10, wherein the water-collection tray and the hot-water source are connected to one another via a return-flow hose.

12. Apparatus for producing a package from two film strips on a roller-type deep-drawing machine substantially as hereinbefore described with reference to the accompanying drawing.

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